

**Bases for Amendments to the Claims**

Applicants amend Claims 1, 15 and 18 to clarify that a methanization catalyst is utilized within the fine purification stage, wherein the methanization catalyst comprises ruthenium. Basis for these amendments is contained in original Claim 6; page 12, lines 9 - 12; page 28, lines 9 - 15; page 29, lines 16 - 26; and the Example on page 30 and 31.

Applicants have also amended Claims 18 and 20 to emphasize that the exothermic catalyst stage comprises a "unitary hollow body." Basis for this amendment is contained in original Claims 1 and 15 and throughout the application.

Because of the amendments to Claim 1, Claims 5 and 6 were cancelled and the dependency of Claims 7 and 8 were amended. Minor amendments were also made to Claim 2.

No new subject matter is introduced by any of these amendments to the claims of the application.

**Amendment**

**The Invention**

Applicants have discovered a unitary exothermic catalyst apparatus having at least one shift stage for the catalytic conversion of a mixture of hydrogen, carbon monoxide and steam and also a fine purification stage located downstream of the shift stage for the catalytic lowering of the residual carbon monoxide content by selective methanization. This joint exothermic catalyst apparatus is comprised of a unitary hollow body. For purposes of the present invention, a "unitary hollow body" is a continuous hollow body which has not been obtained by the joining of at least two shorter hollow bodies, but was originally produced as a single, unitary structure in its final length.

It has been surprisingly discovered that at least two different catalysts can be arranged in this unitary joint hollow body whereby both catalysts, i.e. the shift catalyst and the methanization catalyst, can achieve optimal activity. Previously, it had been believed that each of these types of catalysts had to be applied to separate, individual hollow bodies. In the prior art, to be able to produce these hollow bodies containing each of these catalysts, it was necessary to apply the appropriate

catalyst material in separate hollow bodies to produce optimal catalytic properties. For example, it was previously accepted that the application of a shift catalyst to a hollow body generally required production conditions which were incompatible with the conditions for the application of a methanization catalyst and vice versa. Thus, fixing one catalyst on a hollow body required calcination at a temperature at which the other catalyst was deactivated. In addition, the application of one catalyst after modified important properties of the other catalyst during the impregnation steps, thereby adversely impacting the properties of at least one of the catalysts.

Applicants have surprisingly discovered that by a careful process of production of an exothermic catalyst apparatus in the form of a unitary hollow body, optimal activity of each catalyst can be preserved, especially when the methanization catalyst for the fine purification stage comprises ruthenium. As a result it is possible to utilize a single, unitary hollow body in place of two short hollow bodies that have been used by the prior art. This production procedure is simpler, significantly cheaper and produces a catalyst with good properties for each of the catalytic stages.

**Rejections based on 35 U.S.C. §112**

The USPTO rejected Claims 2, 3 and 15 under 35 U.S.C §112, second para. as being indefinite. Applicants have amended those claims, as suggested, and believe that by those amendments, they have overcome the objections of the Examiner.

**Nonstatutory Double Patenting**

The USPTO rejected Claims 18 - 20 based on a provisional, obviousness-type double patenting citing application serial number 10/508,881. Applicants attach as Exhibit A, a Terminal Disclaimer which overcomes this rejection.

**Discussion of References**

Claim rejections based on Zartenar, et al., U.S. Patent Application Publication No. 2005/0172553 A1.

The USPTO rejected Claims 1 - 14 and 18 - 21 under 35 U.S.C. §102(e), as being anticipated by Zartenar, et al. Applicants respectfully traverse this rejection. (Because of the publication of this reference as WO 2003/080505 on October 2, 2003, Applicants question the propriety of rejecting these claims under 35 U.S.C. §102(e).)

The independent claims of the application have been

amended to clarify that the methanization catalyst for the fine purification stage of the claimed apparatus comprises ruthenium. Applicants assert that by the amendments to the claims, they have overcome the rejection based on Zartenar, et al.

Specifically, Zartenar, et al. disclose a series of hollow bodies containing catalysts useful for the generation of hydrogen. While Zartenar, et al. disclose a device containing different stages, it is clear that each stage (the reformation stage, the shift stage and the fine purification stage) are formed as separate, hollow bodies, each with an annular chamber for housing the corresponding catalyst. Disclosures that each of the respective stages are required to be prepared as separate units are found at paras. 0017, 0030, 0031 and 0033, as well as in independent Claim 22. For example, para. 0031 states that the respective stages "are preferably each embodied as a hollow cylinder...". While the hollow bodies may be adjacent to each other, there is no disclosure or suggestion that they may be formed "unitarily." A person skilled in the art would not find any suggestion in Zartenar, et al. that would teach or suggest the use of a unitary structure for the shift stage and the fine purification stage. In fact, because of the different conditions used for production of the

respective catalytic stages, a person skilled in the art would believe that separate hollow bodies would be preferable.

In contrast, Claim 1 requires that the shift stage and the fine purification stage be formed in a "unitary hollow body." In addition, as disclosed throughout the application, specific and fundamentally distinct production processes are necessary to produce the unitary body with the active catalysts present therein. A full discussion of the distinctions between this reference and the disclosures of Zartenar, et al. is contained in the application at page. 8, line 29 through page 9, line 30, which is incorporated herein by reference. Accordingly, Applicants respectfully assert that Zartenar, et al. fail to disclose any of the claims of the application.

Claim rejection based on Chintawar, et al., based on U.S. Patent No. 6,524,550

The USPTO also rejected Claims 1 - 7, 18 and 21 under 35 U.S.C. §102(b) as being anticipate by Chintawar, et al. Applicants respectfully traverse this rejection.

Chintawar, et al. disclose a process for converting carbon monoxide and water in a reformat stream including carbon dioxide and hydrogen. (Abstract) Specifically,

Chintawar, et al. teach treating a reformat stream in a third reactor section with a catalyst for promoting a low temperature water gas shift reaction, for example, with a catalyst containing iron. (See Col. 10, lines 28 - 34, together with a description of the Figures in Col. 9, lines 5 - 47.) The resulting product stream is then treated with a high temperature, water gas shift catalyst in a second, separate reactor section, which preferably consists of platinum on zirconia. (See Col. 4, lines 51 - 63.)

Chintawar, et al. fail to disclose the presence of a methanization catalyst for a fine purification stage comprising ruthenium, as now claimed by all claims of the application, as amended.

In addition, Chintawar, et al. fail to teach the advantageous structure of a unitary body for each component of their catalyst system, as is claimed by all claims of the application. In fact in the embodiments of Chintawar, et al., as shown in Figures 4 - 6 and Col. 10, lines 28 - 31, the second and third reactor stages are configured as separate units. While there may be some discussion of a possible integration of these units, a strong preference for a unitary structure and the advantages of a unitary structure for the catalyst system of the invention was clearly not recognized, suggested or taught by Chintawar, et

al. Accordingly, Chintawar, et al. fail to teach each and every element of the application, as claimed. Applicants assert that all claims of the application are patentable over Chintawar, et al.

Claim rejection based on Rudy, U.S. Patent No. 5,010,051 or Sung, et al., U.S. Patent No. 6,087,298.

The USPTO also rejected Claims 1 - 8, 10, 12, 13 and 15 - 17 under 35 U.S.C. §102 as anticipated by, or in the alternate under 35 U.S.C. §103, as obvious over Rudy, U.S. Patent No. 5,010,051. In addition, the USPTO rejected Claims 1 - 8, 10, 12, 13, 15 - 18 and 21 under 35 U.S.C. §102(b) as being anticipated by, or under 35 U.S.C. §103 as obvious over, Sung, et al., U.S. Patent No. 6,087,298.

It is clear that neither Rudy nor Sung, et al. teach the types of catalysts that are claimed in the application.

Neither disclose the presence of a methanization catalyst for a fine purification stage comprising ruthenium.

Both patents only disclose catalyst compositions for purifying internal combustion engine exhaust gases. In addition, the catalysts disclosed do not relate to the field of the present application, i.e. a catalyst apparatus for the catalytic conversion of a mixture of hydrogen, carbon monoxide and steam for producing hydrogen. Therefore, a



person skilled in the art would not consider these references for use in solving the problems that are solved by the catalyst of the invention, as claimed. Accordingly, Applicants assert that neither of these references teach the invention, as claimed, and assert that each of the claims are neither anticipated by nor obvious over either of these references.

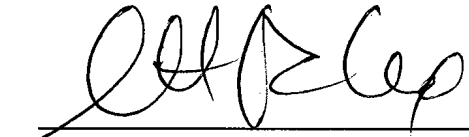
Comments concerning Claims 9, 11, 14, 19 and 21.

Applicants acknowledge and appreciate the conclusion of the Examiner that Claims 9, 11, 14, 19 and 21 have not been rejected under 35 U.S.C. §102 or 35 U.S.C. §103. These claims will be addressed further once this Amendment is considered.

**CONCLUSION**

Applicants believe that all claims of the application are now in condition for allowance and request the issuance of a Notice of Allowance.

Respectfully Submitted,



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**CERTIFICATE OF EFS SUBMISSION (37 C.F.R. § 1.8(a)(i)(1)(C))**

I hereby certify that, on the date shown below, this correspondence is being submitted to the Patent and Trademark Office via the Office Electronic Filing System in accordance with § 1.6(a)(4).

Date: May 21, 2009

Holly Hart  
Signature